MAJOR MAINTENANCE SURCHARGE FORMULA AND COSTS

A Report Prepared for the

Legislative Finance Committee

Subcommittee on Long-Range Building Cash Program Funding

By

Author
Catherine Duncan

March 1, 2006

Legislative Fiscal Division

www.leg.mt.gov/css/fiscal

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Staff from the Division of Architecture and Engineering (A&E) developed maintenance or "renewal" rates for LRBP eligible buildings based on the type of building. That rate then can be allocated across agencies based on the square feet of each building classification by agency. This report will provide the allocation methodology of the costs, by agency and square feet and the costs predicted with the formula.

The major maintenance rates as a percentage of building replacement value are included in the following figure.

Montana State Building Classifications

Building Classification	Code	Renewal Percent (percent charged on value)
Athletic Facilities	AF	2.08%
Student Unions/Dining Halls	D	2.30%
Medical Facilities	HN	2.59%
Correctional Facilities	J	3.47%
Basic Lab/Vacational Shop	LA-B	2.90%
Hi-Tech Laboratories	LA-H	3.76%
Monumental/Museum	MU	2.91%
Classroom/Office Buildings	O	2.16%
Parking Facilities	PKG	1.71%
Central Plants/Tunnels	PL	2.14%
Dormitory/Housing Units	R	2.21%
Warehouse/Storage Facilities	ST	2.73%

Staff used the results of the A&E renewal percentages charged against the current replacement value to derive the cost of the maintenance by category and square feet. For this exercise, staff used the same code designation to denote the building type. The figure on the following page shows the cost per agency and the total cost of each of the building classifications. With the square feet of each building type, an agency allocation rate can be developed. The allocation rates vary between $0.72 and $5.45 per square foot. The average agency wide cost of major maintenance per square foot is $1.74. The total cost per agency is seen in the last column. Basing the agency allocation on the average major maintenance rates (shown in the last row of the figure), the cost per agency could vary slightly.

Agency Maintenance Cost by Classification Category, Square Feet of Occupancy, Total Cost, and Allocation Rate by Square Feet

Agency		Classification Codes AF	D	HN	J	LA-B	LA-H	MU	O	PL	R	ST	Grand Total
Board of Education	Cost	$44,444	$7,195			$10,442			$64,073	$4,112	$52,199		$182,465
	SF	50,874	5,603			9,072			53,458	3,000	41,398		163,405
Administration	Cost						$285,467	$2,192,340	$906,099	$10,130	$13,599	$47,348	$3,454,984
	SF						106,346	314,406	853,752	7,100	11,955	45,850	1,339,409
Agriculture	Cost					$8,297							$8,297
	SF					7,888							7,888
Corrections	Cost		$47,734	$10,069	$2,153,941				$95,690	$12,570	$2,819	$48,607	$2,371,430
	SF		21,481	14,341	675,988				76,145	14,524	5,803	77,340	885,622
Military Affairs	Cost								$420,278			$90,945	$511,223
	SF								418,031			91,207	509,238
Natural Resources and Conservation	Cost								$68,543			$12,270	$80,814
	SF								75,451			28,128	103,579
Public Health and Human Services	Cost	$21,666	$25,479	$586,548	$42,920				$107,381	$19,504	$82,700	$157,258	$1,043,455
	SF	25,962	29,038	300,334	15,328				101,863	16,626	141,967	221,680	852,798
Revenue	Cost											$66,264	$66,264
	SF											91,781	91,781
Justice	Cost	$5,233	$11,747	$2,304					$16,062	$3,582	$31,147		$70,074
	SF	8,764	14,000	2,016					18,340	0	45,723		88,843
Montana State University	Cost	$80,865				$2,137,231	$1,102,353	$174,768	$1,790,918	$30,187	$19,244	$65,331	$5,400,898
	SF	115,872				1,105,725	271,218	95,463	1,365,424	34,324	33,627	109,108	3,130,761
University of Montana	Cost	$40,473				$1,687,465		$64,077	$2,023,293	$46,920	$15,194	$70,740	$3,948,162
	SF	43,085				879,447		36,394	1,557,456	86,553	21,034	62,963	2,686,932
Total Annual Cost		$192,681	$92,155	$598,921	$2,196,861	$3,843,435	$1,387,820	$2,431,186	$5,492,337	$127,006	$216,902	$558,763	$17,138,066
Total Square Feet		244,557	70,122	316,691	691,316	2,002,132	377,564	446,263	4,519,920	162,127	301,507	728,057	9,860,256
Allocation Rate (Cost / Squa		$0.79	$1.31	$1.89	$3.18	$1.92	$3.68	$5.45	$1.22	$0.78	$0.72	$0.77	$1.74

The following is the formula to calculate the appropriation required for an agency based on the average major maintenance rates for each of the categories:

$A_{AB1} = 2*((SF_{AF} * R_{AF}) + (SF_{D} * R_{D}) + (SF_{HN} * R_{HN}) + (SF_{J} * R_{J}) + (SF_{LA\text{-}B} * R_{LA\text{-}B}) + (SF_{LA\text{-}H} * R_{LA\text{-}H}) + (SF_{MU} * R_{MU}) + (SF_{O} * R_{O}) + (SF_{PKG} * R_{PKG}) + (SF_{PL} * R_{PL}) + (SF_{R} * R_{R}) + (SF_{ST} * R_{ST}))_{BE\text{-}1}$

Where:

A_{AB1} = The appropriation for an agency in the upcoming biennium

SF = Square feet of building space occupied by the agency

R = The major maintenance allocation rate

BE-1 = The end of the previous biennium

Remaining Subscripts = The Montana building classification developed by A&E

Simplified the formula would appear:

$A_{AB1} = \Sigma\ (Sf_{c1\ –\ c12} * R_{c1\ -\ c12})_{BE\text{-}1}$

Where:

A_{AB1} = The appropriation for an agency in the upcoming biennium

SF = Square feet of building space occupied by the agency

R = The major maintenance allocation rate

C1 – C12 = Building classification codes AF through ST

BE-1 = The end of the previous biennium

This formula produces cost per agency as shown in the figure on the following page. Notice that the square feet of occupancy and the square foot rates are the same as seen in the previous table. However, the actual cost per agency has changed slightly with of the use of the average square foot cost.

Agency Maintenance Cost by Classification Category, Square Feet of Occupancy, Total Cost, and Allocation Rate by Square Feet

Agency		Classification Codes AF	D	HN	J	LA-B	LA-H	MU	O	PL	R	ST	Annual Total	Biennial Total
Allocation Rate (Cost / SF)		$0.79	$1.31	$1.89	$3.18	$1.92	$3.68	$5.45	$1.22	$0.78	$0.72	$0.77	$1.74	
Board of Education	Cost	$40,082	$7,363	$0	$0	$17,415	$0	$0	$64,959	$2,350	$29,781	$0	$161,952	$323,903
	SF	50,874	5,603			9,072			53,458	3,000	41,398		163,405	
Administration	Cost	$0	$0	$0	$0	$0	$390,898	$1,712,845	$1,037,428	$5,562	$8,600	$35,189	$3,190,523	$6,381,045
	SF						106,346	314,406	853,752	7,100	11,955	45,850	1,339,409	
Agriculture	Cost	$0	$0	$0	$0	$15,142	$0	$0	$0	$0	$0	$0	$15,142	$30,285
	SF					7,888							7,888	
Corrections	Cost	$0	$28,230	$27,121	$2,148,152	$0	$0	$0	$92,527	$11,378	$4,175	$59,356	$2,370,939	$4,741,878
	SF		21,481	14,341	675,988				76,145	14,524	5,803	77,340	885,622	
Military Affairs	Cost	$0	$0	$0	$0	$0	$0	$0	$507,966	$0	$0	$69,999	$577,965	$1,155,930
	SF								418,031			91,207	509,238	
Natural Resources and Conservation	Cost	$0	$0	$0	$0	$0	$0	$0	$91,684	$0	$0	$21,587	$113,271	$226,542
	SF								75,451			28,128	103,579	
Public Health and Human Services	Cost	$20,455	$38,162	$567,987	$48,709	$0	$0	$0	$123,778	$13,024	$102,130	$170,133	$1,084,378	$2,168,756
	SF	25,962	29,038	300,334	15,328				101,863	16,626	141,967	221,680	852,798	
Revenue	Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$70,439	$70,439	$140,879
	SF											91,781	91,781	
Justice	Cost	$6,905	$18,399	$3,813	$0	$0	$0	$0	$22,286	$0	$32,893	$0	$84,295	$168,590
	SF	8,764	14,000	2,016					18,340	0	45,723		88,843	
Montana State University	Cost	$91,293	$0	$0	$0	$2,122,629	$996,922	$520,071	$1,659,182	$26,889	$24,191	$83,737	$5,524,912	$11,049,825
	SF	115,872				1,105,725	271,218	95,463	1,365,424	34,324	33,627	109,108	3,130,761	
University of Montana	Cost	$33,946	$0	$0	$0	$1,688,249	$0	$198,270	$1,892,527	$67,803	$15,132	$48,322	$3,944,250	$7,888,499
	SF	43,085				879,447		36,394	1,557,456	86,553	21,034	62,963	2,686,932	
Total Annual Cost		$192,681	$92,155	$598,921	$2,196,861	$3,843,435	$1,387,820	$2,431,186	$5,492,337	$127,006	$216,902	$558,763	$17,138,066	$34,276,132
Total Square Feet		244,557	70,122	316,691	691,316	2,002,132	377,564	446,263	4,519,920	162,127	301,507	728,057	9,860,256	

There are two ways that this major maintenance cost allocation formula can be applied to future biennia. The first method would entail reprocessing the state building inventory on a biennial basis. The second method would apply an annual inflation factor to the current major maintenance square foot rate. Both methods are described below.

Method 1

Simply put, the methodology of creating the major maintenance rates by building and square foot required staff to obtain the most recent Risk Management and Tort Defense (RMTD) inventory of state buildings (2005), remove state buildings that are not eligible for LRBP funded major maintenance, apply the developed annual renewal rates to the replacement costs of all the buildings, sort the building list by building classification, sum the annual maintenance costs by classification, and the divide the sum of the maintenance costs by the square feet of building space in each category. This methodology could be undertaken each biennium to update the cost responsibility for each agency. The advantage to using this methodology in future biennia is that changes in building replacement value and square feet of occupancy would be fully captured, making the maintenance surcharge to the agencies more accurate. The disadvantage is that this methodology is that it takes slightly more time to develop the new biennial rates.

Method 2

Instead of going through the process of reevaluating the building inventory each biennium, future costs could be developed by applying a maintenance inflation rate to the current formula. To properly estimate future maintenance costs, staff would need to obtain the most recent RMTD building inventory to determine changes in the number of square feet occupied by agency. The Bureau of Economic Analysis is currently developing a series of non-residential building cost indexes that could be used to increase the rates developed in this analysis. The resulting formula would appear as follows:

$A_{AB1} = \Sigma\ (Sf_{c1\ -\ c12} * (R_{c1\ -\ c12} * (1+I))_{BE-1}$

Where:

A_{AB1} = The appropriation for an agency in the upcoming biennium
SF = Square feet of building space occupied by the agency
R = The major maintenance allocation rate
C1 – C12 = Building classification codes AF through ST
I = The inflation rate of non-residential building costs
BE-1 = The end of the previous biennium

The advantage of second method is that the future costs will be more predictable. Furthermore, this methodology is less complicated. The disadvantage is that this methodology lacks the accuracy inherent in the first methodology. About the use of such a methodology (method 2) the Building Research Board says:

> "Typical maintenance expenditure per square foot is frequently used as a yardstick for determining what an appropriate level of M&R (maintenance and repair) budgeting should be, but such a measure is insufficiently sensitive to either external financial conditions or building characteristics. The relationship is better stated in terms of an annual percentage of the inventory's current replacement value"[1]

This quote suggests that budgeting for the future costs of building maintenance be performed using the first methodology.

Assuming a constant square feet occupancy rate, future biennial maintenance costs using the second method can be estimated using a non-residential building cost inflation rate of 3.91 percent per year. The results of this methodology are presented in the figure on the following page.

[1] National Academy of Sciences, National Research Council. "Committing to the Cost of Ownership: Maintenance and Repair of Public Buildings". 1990. pp. 18.

Estimated Major Maintenance By State Agency

Bien.	Board of Education	Administration	Agriculture	Corrections	Military Affairs	Natural Resources and Conservation	Public Health and Human Services	Revenue	Justice	Montana State University	University of Montana	Total
2009	$323,903	$6,381,045	$30,285	$4,741,878	$1,155,930	$226,542	$2,168,756	$140,879	$168,590	$11,049,825	$7,888,499	$34,276,132
2011	336,568	6,630,544	31,469	4,927,286	1,201,127	235,400	2,253,554	146,387	175,182	11,481,873	8,196,940	35,616,328
2013	349,728	6,889,798	32,699	5,119,943	1,248,091	244,604	2,341,668	152,111	182,031	11,930,814	8,517,440	37,008,927
2015	363,402	7,159,190	33,978	5,320,132	1,296,891	254,168	2,433,227	158,058	189,149	12,397,309	8,850,472	38,455,976
2017	377,611	7,439,114	35,306	5,528,150	1,347,600	264,106	2,528,366	164,238	196,544	12,882,044	9,196,525	39,959,605
2019	392,376	7,729,983	36,687	5,744,300	1,400,291	274,432	2,627,225	170,660	204,229	13,385,732	9,556,110	41,522,025
2021	407,718	8,032,226	38,121	5,968,902	1,455,042	285,163	2,729,950	177,333	212,215	13,909,114	9,929,753	43,145,536
2023	423,659	8,346,286	39,612	6,202,287	1,511,934	296,313	2,836,691	184,266	220,512	14,452,960	10,318,007	44,832,527
2025	440,224	8,672,625	41,161	6,444,796	1,571,051	307,898	2,947,605	191,471	229,134	15,018,071	10,721,441	46,585,478
2027	457,437	9,011,725	42,770	6,696,787	1,632,479	319,937	3,062,857	198,958	238,093	15,605,277	11,140,649	48,406,971

Use of the methodology analyzed in this report is significantly more costly than the earlier mentioned methodology of charging one percent of replacement value. In the first biennium, the cost of this methodology would be $34.3 million. The most recent RMTD inventory of LRBP eligible buildings shows a total replacement value for those buildings (valued at $100,000 or more) at $1.07 billion. Consequently, the appropriation recommended in this formula would charge the state 1.6 percent of replacement value annually. Using the discussed one percent of replacement value annually as the basis for the building maintenance appropriation, the costs to the state using the inventory (valued at $100,000 or more) would cost $10.7 million in the first year or $21.4 million in the first biennium. Allocation of the costs across agencies could be made by square foot of occupied space (with the formula developed in this report) regardless of the methodology used to develop total cost.

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